Evaluating Risks of Exposure to Total Petroleum Hydrocarbons

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Fuels are a mixture of hundreds of petroleum hydrocarbons. However, the risks to human health associated with petroleum hydrocarbons released from leaking underground storage tanks (LUSTs) are typically evaluated based only upon the concentrations of a limited number of chemicals-of-concern. These chemicals-of-concern are typically selected because of their toxicity (e.g., benzene, toluene, ethyl benzene, xylene, benzo(a)pyrene), potential for impacts to taste and odor (methyl term-butyl ether, MTBE), and a need to reduce analytical/investigation costs by limiting the suite of chemical analytes. Characterization of the numerous other chemicals that comprise fuels is expensive and rarely undertaken. As a result, many LUST sites have been closed with a variety of total petroleum hydrocarbons (TPH) remaining in soil and ground water, presenting a potential but undefined risk to human health and the environment. This project expands upon the Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG) method for evaluating the risks associated with TPH exposure. Solubilities of hydrocarbon fractions and their influence on apparent TPH toxicitiy are evaluated through successive bench scale leaching simulations. Dilution attentuation factors that are typically used to define soil concentrations that are protective of ground water are evaluated and expanded to incorporate biodegradation. Finally a tiered approach is proposed for calculating both risk-based screening levels and site-specific target levels for TPH.